1970 OPERATING SUMMARY

WESTMINSTER

water pollution control plant

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Division of Plant Operations

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Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 195
Ontario

Once again we have the privilege of submitting to you our latest detailed report on financial progress and technical activity at your water pollution control plant.

The statistical information contained in this annual operating summary will undoubtedly be a useful barometer of efficiency. Of particular interest will be the comments and recommendations of the regional operations engineer, who was intimately connected with day-to-day operation throughout 1970.

Together with the extensive cost data provided, this information should assist greatly in your general understanding of the problems met and dealt with, and in furnishing a yardstick for possible future expansion.

D S Caverly

D.S. Caverly,
General Manager.

D McTavish

D.A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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WESTMINSTER

water pollution control plant

operated for

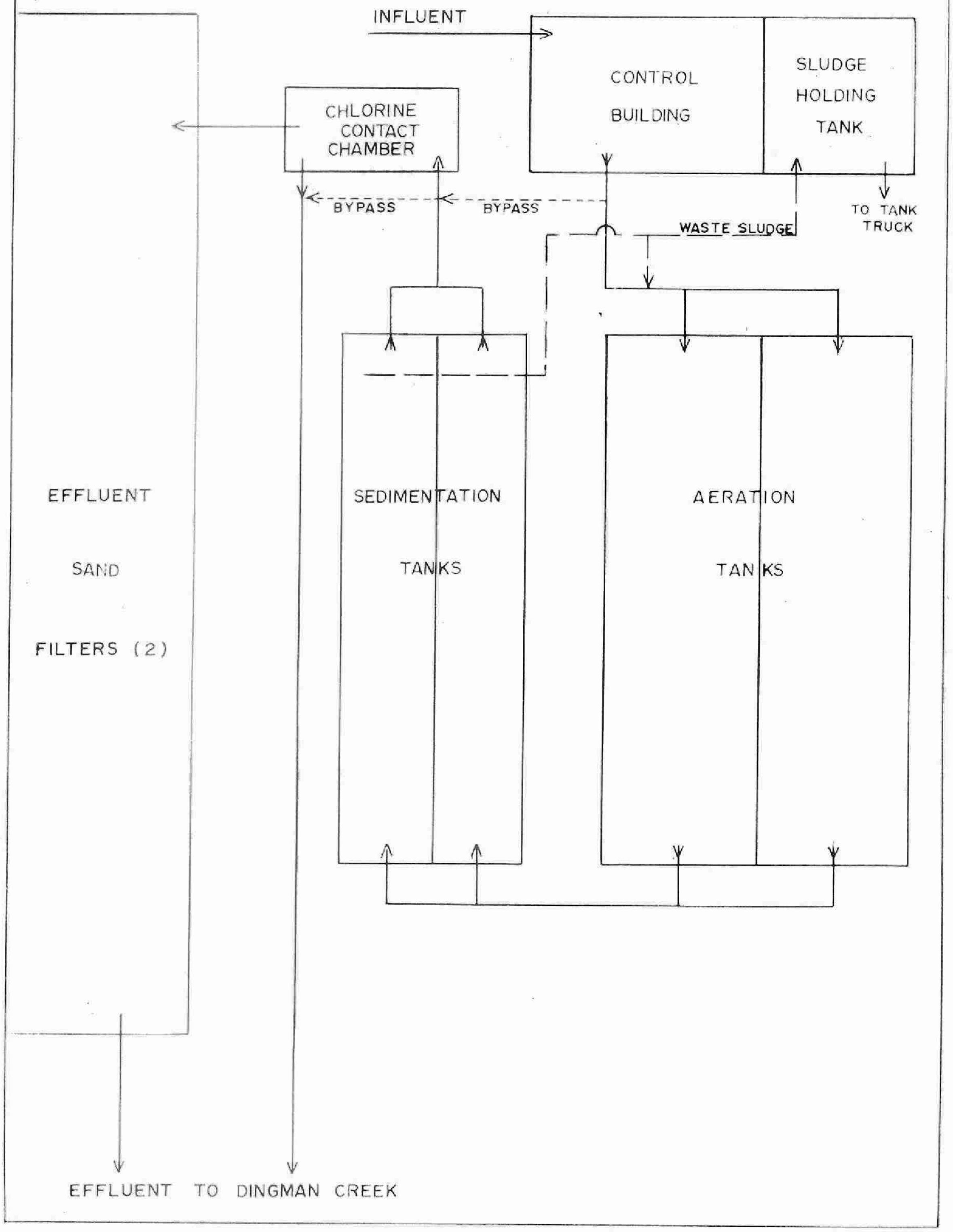
THE TOWNSHIP OF WESTMINSTER

by the

ONTARIO WATER RESOURCES COMMISSION

1970 ANNUAL OPERATING SUMMARY

WESTMINSTER TOWNSHIP
WATER POLLUTION CONTROL PLANT



DESIGN DATA

PROJECT NO.	2-0033-59	TREATMENT	Extended Aeration
DESIGN FLOW	0.25 mgd	DESIGN POPULATION	5,000

PRETREATMENT

Comminution

Type: Barminutor
Size: One Model B (12")
Chicago Pump Co.

RAW SEWAGE PUMPS

Type: Chicago Pump
Size: Two 100 gpm @ 23' tdh (#1 pump standby powered by Wisconsin gasoline engine)

SECONDARY TREATMENT

Aeration Tanks

Type: Diffused air; single-pass
Size: Two 54' x 27' x 14' (252,000 gal)
Retention: 24.2 hr

Diffusers

- Discfusers on swing arm

Air Supply

Type: Sutorbilt
Size: Three 337 scfm @ 7 psi

Secondary Sedimentation

Type: Link-Belt
Size: Two 54' x 8' x 9.25' (50,200 gal)
Retention: 4.80 hr
Loading: Surface, 580 gal/ft^2/day
Weir, 1955 gal/ft/day

CHLORINATION

Type: W & T
Size: One 100 lb/day

Chlorine Contact Chamber

Size: One 10' x 7' x 9' (3930 gal)
Retention: 22.7 min

OUTFALL

- to Dingman Creek

TERTIARY TREATMENT

Effluent Sand Filters

Size: Four units (26,900 sq ft or 0.62 acres)
Depth: 30" of sand (min)
Capacity: .405 mil gal/acre/day

SLUDGE HANDLING

Sludge Holding Tank

Size: 4,460 cu ft or 27,850 gal

'70 REVIEW

FLOWS	DAILY FLOW mil gal	OCCURRING IN THE MONTH OF	MONTHLY FLOW mil gal	OCCURRING IN THE MONTH OF
Average	.40	—	12.20	—
High	.58	Apr. July Aug.	16.41	July
Low	.15	December	7.42	November

GENERAL

This project consists of a 0.25 mgd total oxidation treatment plant with comminution, raw sewage pumping, diffused air aeration, final settling, chlorination, effluent sand filters, a sludge holding tank and liquid sludge disposal. Also included is about a mile and a half of 21-inch diameter trunk sewer.

The plant's chief operator is aided by a casual worker on weekends and vacations, and periods of sickness or unusually heavy workload.

Industrial waste dumps of a serious nature were not experienced during 1970. However, storm runoff containing high concentrations of clay and silt entered the plant on numerous occasions. This problem was alleviated when the City of London began diverting part of the flows to the London system in late August. Occasional recurrences of high, muddy flows were again experienced during December.

Operation of the effluent sand filters during the winter, (initiated in 1970), appears to be proving successful, with marked improvement of the effluent.

An intensive program of upgrading plant buildings and equipment was pursued and completed during the year.

EXPENDITURES - (1969 figures in brackets)

The operating cost for 1970 was $24,170.67 ($17,264.18). The cost per million gallons treated was $165.08 ($136.53). Most of the additional expenses were associated with the plant upgrading program.

PLANT FLOWS and CHLORINATION

Plant flows during 1970 amounted to a total of 146.42 million gallons, an increase of 16% over 1969. The design flow of .25 mgd was exceeded almost continually, except during the months of September to December. The flow during the month of July averaged 530,000 gpd, or 212% of design.

A total of 1,800 lbs. of chlorine was used at an average dosage of 2.5 mg/l during the period May through November, unchanged from the previous year. A residual of 0.5 mg/l in the effluent was maintained during the chlorination period.

PLANT EFFICIENCY

The average strength of the raw sewage during the year was 115 mg/l BOD and 150 mg/l suspended solids. The final effluent averaged 11 mg/l BOD and 15 mg/l suspended solids, indicating reductions of 90% for each, on an average over the year, unchanged from 1969. From the probability graphs it can be seen that the effluent BOD met the OWRC objective of 15 mg/l 80% of the time, and suspended solids 50% of the time. The above results are based on composite samples taken every two weeks. One sample in July was deleted as its high suspended solids values were not representative of the two week period.

The plant operated at an average of 184% of its hydraulic design capacity during January through August, until the City of London diverted part of the flows to their system. During the remainder of the year, flows were reduced to near design levels. Plant efficiency during the high flow period was 85% for both BOD and suspended solids. However, during the period when flows were reduced to near design levels, BOD removals averaged 97% and suspended solids removal averaged at least 93%. During part of this period the laboratory reported effluent suspended solids results as "less than 15", whereas from past experience the actual averaged less than 5 mg/l.

AERATION

The mixed liquor suspended solids averaged 6540 mg/l during the year. The BOD loading per pound of MLSS remained at 0.03 lbs. unchanged from 1969.

EFFLUENT SAND FILTERS

The effluent sand filters were operated from April 25 to December 31, with the exception of a short period in July. During the period of operation, the secondary effluent BOD averaged 16 mg/l and suspended solids averaged 26 mg/l, whereas the plant effluent following sand filtration averaged 9 mg/l BOD and 12 mg/l suspended solids, indicating additional removal of 44% for BOD and 54% for suspended solids. The sand filters appear to be a very effective form of tertiary treatment, even under winter weather conditions. The secondary effluent was not directed to the sand filters during periods of high clay-silt turbidity, as this material would quickly render the beds unserviceable.

CONCLUSIONS

The plant operated at 184% of its design capacity up to August of 1970. Flows were then generally stabilized at near the plant design level.

The plant produced a reasonably good effluent throughout the high flow period and a high quality effluent when operating near hydraulic design levels.

The effluent sand beds, normally operated only during the warmer months of the year, were kept in use throughout the fall, without operating difficulties. It is anticipated that they will be used year round in future as their use markedly improved effluent quality.

A program of improving the condition of plant buildings and equipment, pursued throughout the year has placed the plant in excellent condition.

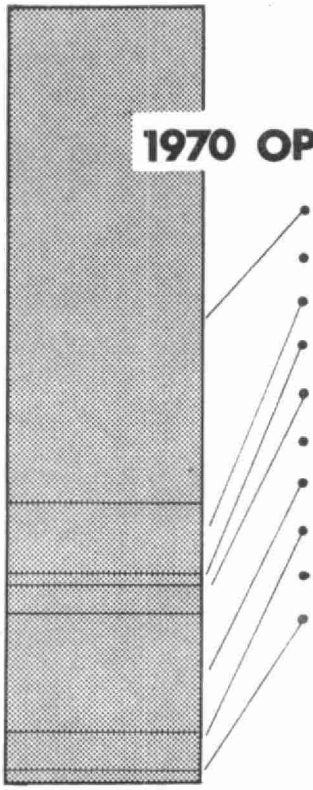
PROJECT COSTS

NET CAPITAL COST (Final)	$270,727.24
DEDUCT - Portion financed by CMHC/MDLB (Final)	65,773.40
Long Term Debt to OWRC	$204,953.84
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	$102,144.64
Net Operating	$ 24,170.67
Debt Retirement	17,673.00
Reserve	814.18
Interest Charged	11,482.78
TOTAL	$ 54,140.63

RESERVE ACCOUNT

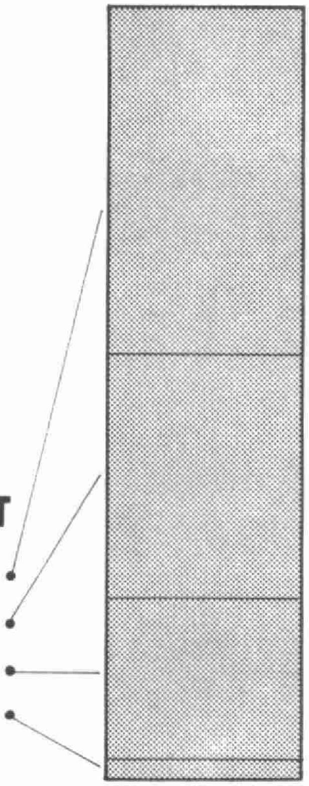
Balance @ January 1, 1970	$ 18,796.13
Deposited by Municipality	814.18
Interest Earned	1,231.35
	$ 20,841.66
Less Expenditures	-
Balance @ December 31, 1970	$ 20,841.66

1970 OPERATING COSTS



PAYROLL	63 %
FUEL	%
POWER	9 %
CHEMICALS	1 %
GENERAL SUPPLIES	4 %
EQUIPMENT	< 1 %
REPAIRS & MAINTENANCE	15 %
SUNDRY	6 %
WATER	%
TRAVEL	2 %

TOTAL ANNUAL COST



NET OPERATING	45 %
DEBT RETIREMENT	32 %
INTEREST	21 %
RESERVE FUND	2 %

Yearly Operating Costs

YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1966	65.66	$13,449.12	$204.81	25 cents
1967	88.08	13,914.02	157.97	17 cents
1968	75.92	15,471.07	203.78	11 cents
1969	126.45	17,264.18	136.53	16 cents
1970	146.42	24,170.67	165.08	18 cents

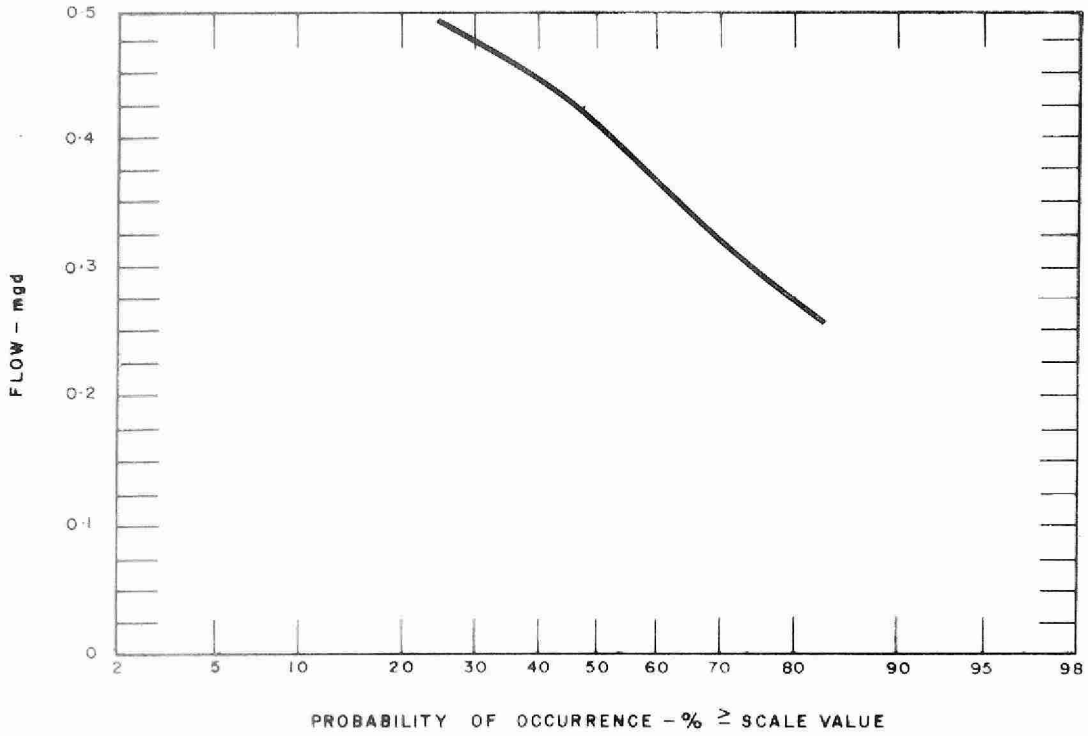
MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY *	WATER	TRAVEL
JAN	1656.59	888.58	445.66	-	196.48	-	42.42	-	-	-	-	83.45
FEB	1417.97	647.42	411.96	-	200.33	-	51.68	-	72.78	33.80	-	-
MAR	1444.91	708.96	411.96	-	191.53	-	73.36	-	-	-	-	59.10
APR	1487.96	655.24	411.96	-	203.63	-	57.43	26.50	94.34	38.86	-	-
MAY	1618.79	709.31	411.96	-	174.48	-	64.61	-	180.69	17.74	-	60.00
JUNE	2613.81	687.61	411.96	-	164.58	-	100.50	-	584.88	664.28	-	-
JULY	2552.52	633.53	1105.04	-	169.53	348.71	81.34	-	114.43	34.48	-	65.46
AUG	3475.21	954.94	1447.46	-	166.78	-	67.47	24.02	774.94	39.60	-	-
SEPT	1674.00	640.24	419.68	-	165.68	-	79.36	4.00	113.39	191.95	-	59.70
OCT	1740.05	633.64	470.20	-	164.58	-	51.12	-	225.84	16.90	-	177.77
NOV	1685.70	722.99	411.96	-	-	-	75.43	-	61.42	353.00	-	60.90
DEC	2803.16	633.74	411.96	-	340.16	-	107.00	-	1274.98	35.32	-	-
TOTAL	24170.67	8516.20	6771.76	-	2137.76	348.71	851.75	54.52	3497.69	1425.93	-	566.38

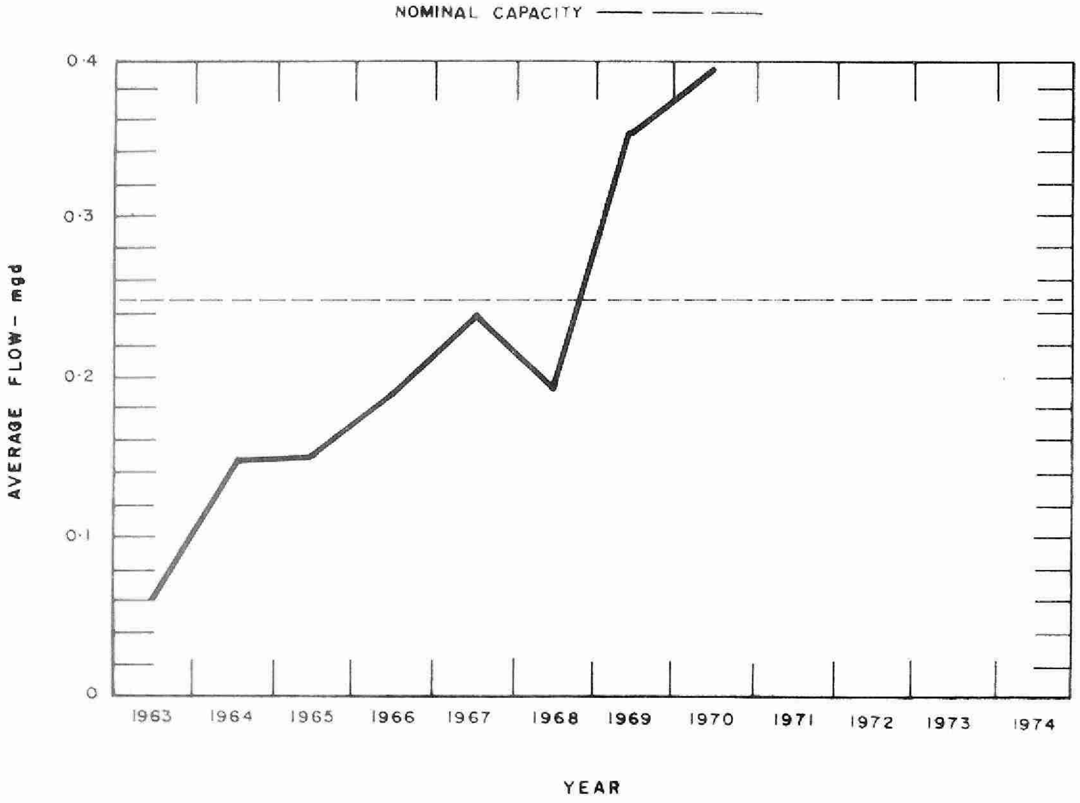
BRACKETS INDICATE CREDIT

* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE $595.00

PROCESS DATA


0·5
0·4
0·3
0·2
0·1
0
FLOW – mgd
2
5
10
20
30
40
50
60
70
80
90
95
98
PROBABILITY OF OCCURRENCE – % ≥ SCALE VALUE

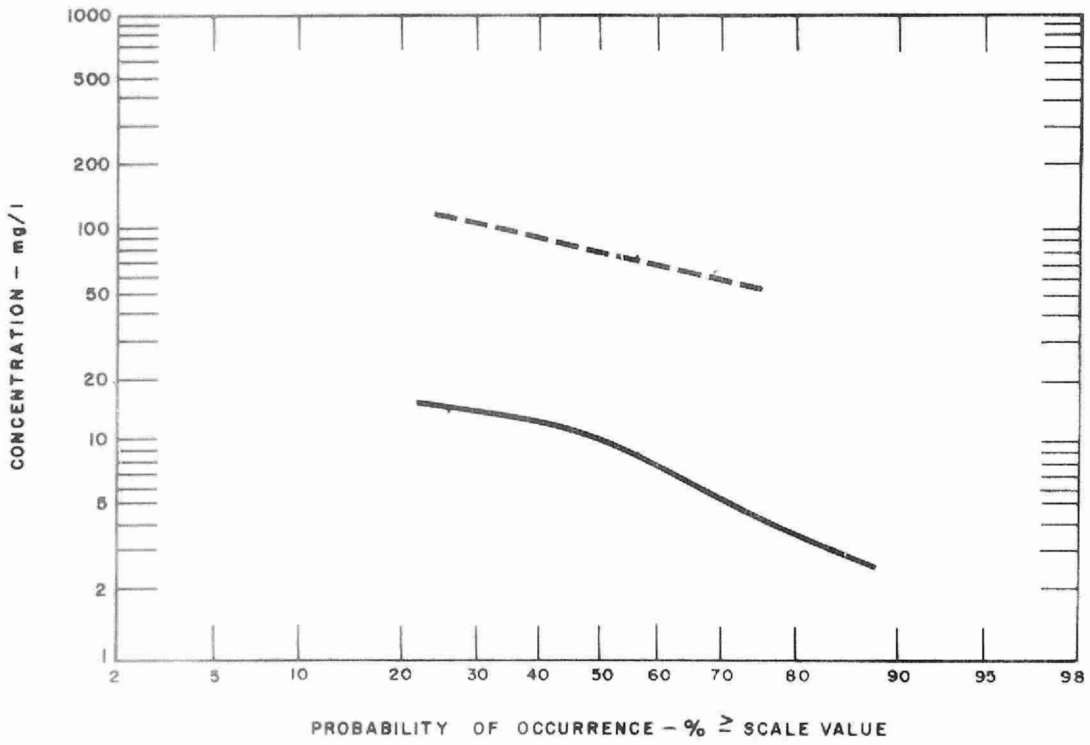
FLOWS


NOMINAL CAPACITY — — —
0·4
0·3
0·2
0·1
0
AVERAGE FLOW – mgd
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
YEAR

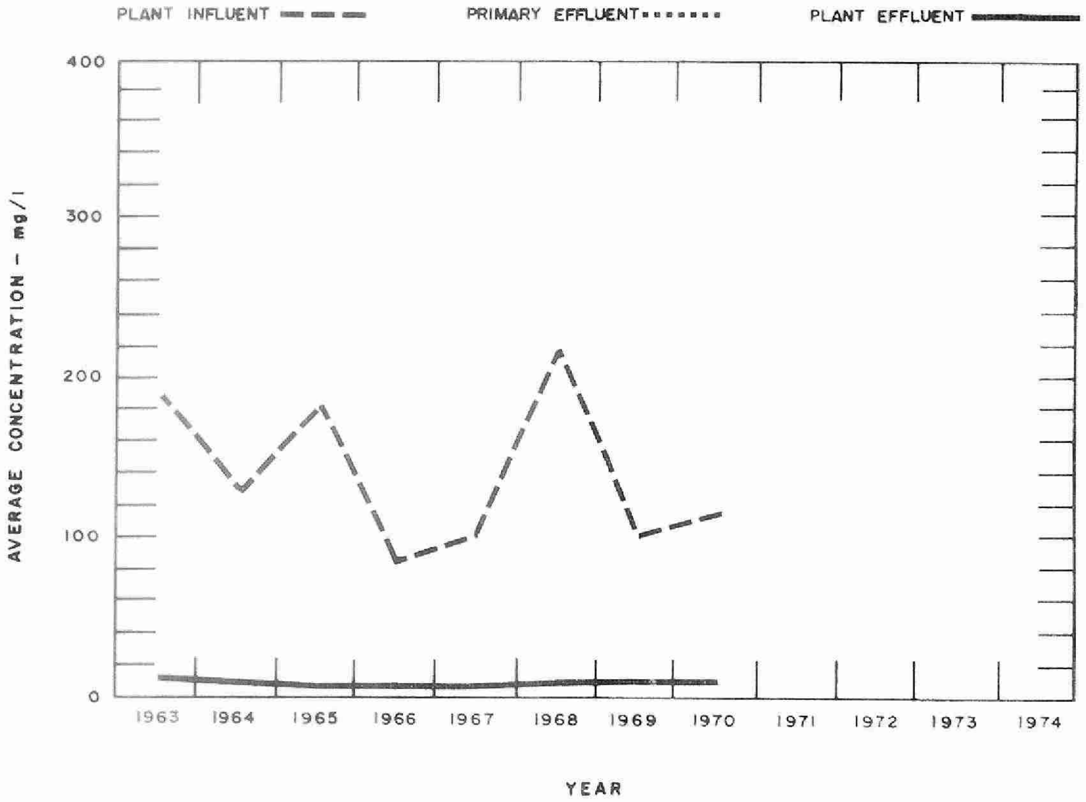
PLANT FLOWS and CHLORINATION

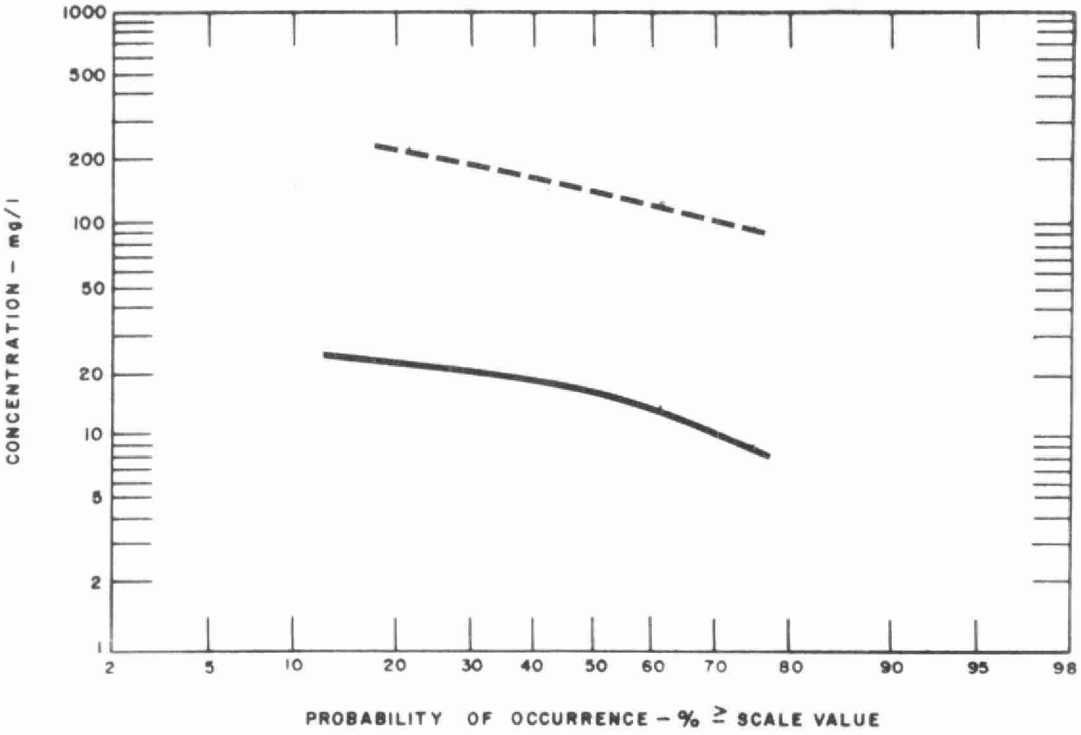
MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED pounds	DOSAGE * mg/l
JAN	12.03	.39	.56	.26	0	0
FEB	12.90	.46	.57	.35	0	0
MAR	15.95	.51	.40	.38	0	0
APR	13.65	.47	.58	.26	0	0
MAY	12.07	.39	.54	.22	170	2.4
JUNE	13.52	.45	.57	.27	320	2.3
JULY	16.41	.53	.58	.28	340	2.0
AUG	13.97	.45	.58	.18	320	2.3
SEPT	8.13	.27	.37	.19	250	3.1
OCT	8.31	.27	.38	.19	300	3.5
NOV	7.42	.25	.43	.16	110	2.8
DEC	12.06	.40	.49	.15	-	-
TOTAL	146.42	-	-	-	1800	-
AVERAGE	12.20	.40	-	-	-	2.5

* Dosage during period of application.

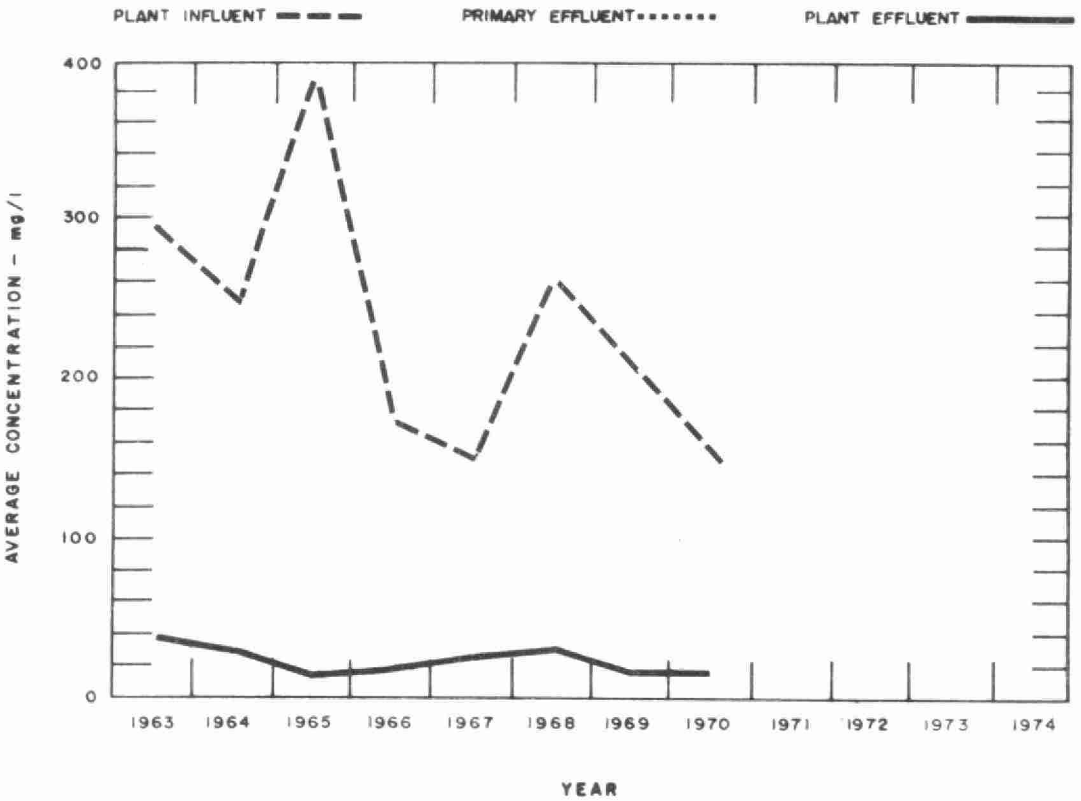


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND						SUSPENDED SOLIDS						GRIT REMOVED
	INFLUENT		EFFLUENT		REDUCTION		INFLUENT		EFFLUENT		REDUCTION		
	n	mg/l	n	mg/l	%	10^3 pounds	n	mg/l	n	mg/l	%	10^3 pounds	cu ft
JAN	2	115	2	12	89	12	2	214	2	12	94	24	–
FEB	2	60	2	17	72	6	2	80	2	21	74	8	–
MAR	2	62	2	10	84	8	2	85	2	39	54	7	–
APR	2	100	2	11	89	12	2	106	2	17	89	12	–
MAY	2	73	2	5	93	8	2	130	2	10	92	14	–
JUNE	2	130	2	14	89	16	2	193	2	12	94	24	–
JULY	1	100	1	16	84	14	1	202	1	6	97	32	–
AUG	2	115	2	26	77	12	2	177	2	23	87	22	–
SEPT	2	412	2	8	98	33	2	247	2	6	98	20	–
OCT	2	80	2	4	95	6	2	160	2	8	95	13	–
NOV	2	70	2	2	97	5	2	107	2	15	86	7	–
DEC	2	54	2	1	98	6	2	125	2	7	94	14	–
TOTAL	23	–	23	–	–	138	23	–	23	–	–	197	–
AVERAGE	–	115	–	11	90	11	–	150	–	15	90	16	–

NOTE – *n is the number of samples taken*

– Sand filters in operation April 25 to June 29 and July 18 to December 31.

AERATION

MONTH	AVG DAILY FLOW mil gal	AERATION INF.		SECONDY EFF.		M L S S CONCN mg/l	F/M lb BOD / lb MLSS	AIR USED 1000 cu ft / lb BOD	WASTE SLUDGE lb/DAY
		B O D mg/l	S S CONCN mg/l	B O D mg/l	S S CONCN mg/l				
JAN	.39	115	214	12	12	7010	.02	1.2	90
FEB	.46	60	80	17	21	5760	.02	2.4	20
MAR	.51	62	85	10	39	6120	.02	1.8	0
APR	.47	100	106	11	17	6120	.03	1.2	110
MAY	.39	73	130	7	24	6370	.02	1.8	50
JUNE	.45	130	193	28	43	6620	.03	.9	90
JULY	.53	100	202	14	47	5810	.04	1.1	90
AUG	.45	115	177	48	54	6190	.03	1.2	80
SEPT	.27	412	247	13	15	7140	.06	.4	160
OCT	.27	80	160	6	15	7120	.01	2.4	140
NOV	.25	70	107	6	15	7360	.01	2.9	80
DEC	.40	54	125	7	15	6810	.01	2.4	60
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	.40	115	150	18	26	6540	.03	1.6	80

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